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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/758,611 | 01/14/2004 | David A. Stewart | ARC-14743-1 | 7529 |

25186 7590 09/07/2005

NASA AMES RESEARCH CENTER
ATTN: PATENT COUNSEL
MAIL STOP 202A-4
MOFFETT FIELD, CA 94035-1000

| EXAMINER | |
|---|---|
| IVEY, ELIZABETH D | |
| **ART UNIT** | **PAPER NUMBER** |
| 1775 | |

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 10/758,611 | STEWART ET AL. |
| | Examiner | Art Unit |
| | Elizabeth Ivey | 1775 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *14 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *30-37* is/are allowed.

6)☒ Claim(s) *1-4,10-12 and 38-45* is/are rejected.

7)☒ Claim(s) *5-9,13-29 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *14 January 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.



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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,093,771 to Goldstein et al. in view of U.S. Patent Application 2001/0051218 A1 to Wittenauer et al.

Regarding claims 1-4 and 10, Goldstein discloses a reaction glass coating (RGC) of borosilicate glass and at least one intermetallic or metallic substance such as silicon hexaboride, which can act as a fluxing agent processing aid (as indicated in the abstract of U.S. Patent 5,079,082 to Leiser et al). Goldstein discloses this coating as particularly useful on porous silica

structures such as space shuttle heat shields (column 2 line 1), which are used at high temperatures. Goldstein discloses the coating to provide temperature resistance up to about 1482°C. Goldstein does not disclose a tantalum disilicide in the coating. Wittenauer (218) discloses a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]) with a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi2) (also commonly called tantalum disilicide as confirmed by internet websites http://www.azom.com/details.asp?ArticleID=2345 and http://www.micrometals.com/tantalum_silicide.htm). Wittenauer (218) discloses the use of such silicides for the purpose of providing to a substrate with oxidation protection, high emissivity, and resistance to mechanical damage along with the ability to withstand high temperature environments, including those associated with atmospheric reentry, jet turbine combustion, and rocket propulsion (pages 1-2 paragraph [0015]) as may occur with space shuttle operation, with higher temperature performance than silica based coatings (page 2 paragraph [0016]). Wittenauer (218) discloses that the silicide component provides a high melting point and high emissivity characteristic to the coating (page 2 paragraph [0029]). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the high temperature resistant silicide material such as molybdenum and or tantalum disilicide of Wittenauer (218) into the borosilicate glass composition of Goldstein in order to increase the high temperature performance of the coating.

Regarding claims 11-12, Goldstein and Wittenauer (218) together disclose all of the limitations of claim 1. Neither Goldstein nor Wittenauer (218) disclose a particle size of the components of 5μm or less or a mode of 1μm or less but Goldstein does disclose that the properties of the coating may be modified by varying the particle size and size distribution of the components for the intended application (column 6 line 66 – column 7 line 1), Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle sizing of the components for the intended application since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 38 and 41-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,093,771 to Goldstein et al. in view of U.S. Patent Application 2001/0051218 A1 to Wittenauer (218) et al.

Regarding claim 38, Goldstein discloses a reaction glass coating (RGC) of borosilicate glass and at least one intermetallic or metallic substance such as silicon hexaboride, which can act as a fluxing agent processing aid (as indicated in the abstract of U.S. Patent 5,079,082 to Leiser et al). Goldstein discloses this coating as particularly useful on porous silica structures such as space shuttle heat shields (column 2 line 1), which are used at high temperatures. Goldstein discloses the coating to provide temperature resistance up to about 1482°C. Goldstein does not disclose a tantalum disilicide in the coating. Wittenauer (218) discloses a ceramic oxide

base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]) with a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi2) (also commonly called tantalum disilicide). Wittenauer (218) discloses the use of such silicides for the purpose of providing to a substrate with oxidation protection, high emissivity, and resistance to mechanical damage along with the ability to withstand high temperature environments, including those associated with atmospheric reentry, jet turbine combustion, and rocket propulsion (pages 1-2 paragraph [0015]) as may occur with space shuttle operation, with higher temperature performance than silica based coatings (page 2 paragraph [0016]). Wittenauer (218) discloses that the silicide component provides a high melting point and high emissivity characteristic to the coating (page 2 paragraph [0029]). Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the high temperature resistant silicide material such as molybdenum and or tantalum disilicide of Wittenauer (218) into the borosilicate glass composition of Goldstein in order to increase the high temperature performance of the coating.

Regarding claims 41-43, Goldstein discloses a coating sintered at 2225°F (column 4 lines 49-51), however, claims 41-43 are product by process claims and the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced

by the process is in some manner measurably distinct from the product produced by another process." *See MPEP 2113.* As such, the process limitations within claims 41-43 do not provide patentable distinction over the prior art.

Regarding claims 44 and 45, Goldstein and Wittenauer (218) together disclose all of the limitations of claim 1 disclose that the properties of the coating may be modified by varying the particle size and size distribution of the components for the intended application (column 6 line 66 – column 7 line 1), since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 1-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,093,771 to Goldstein et al. in view of U.S. Patent 6,444,271 B2 to Wittenauer et al.

Regarding claims 1-4 and 10, Goldstein discloses a reaction glass coating (RGC) of borosilicate glass and at least one intermetallic or metallic substance such as silicon hexaboride, which can act as a fluxing agent processing aid (as indicated in the abstract of U.S. Patent 5,079,082 to Leiser et al). Goldstein discloses this coating as particularly useful on porous silica structures such as space shuttle heat shields (column 2 line 1), which are used at high temperatures. Goldstein discloses the coating to provide temperature resistance up to about

1482°C. Goldstein does not disclose a tantalum disilicide in the coating. Wittenauer (271) discloses a ceramic oxide base structure (substrate) such as fibrous silica based materials (column 1 lines 21-22) and alumina silica blends with a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (column 3 lines 53-58) (with a composition of $TaSi2$) (also commonly called tantalum disilicide). Wittenauer (271) discloses the use of such silicides for the purpose of providing to a substrate with oxidation protection, high emissivity, and resistance to mechanical damage along with the ability to withstand high temperature environments, including those associated with atmospheric reentry, jet turbine combustion, and rocket propulsion (column 2 lines 58-62) as may occur with space shuttle operation, with higher temperature performance than silica based coatings (column 2 lines 54-65). Wittenauer (271) discloses that the silicide component provides a high melting point and high emissivity characteristic to the coating. Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the high temperature resistant silicide material such as molybdenum and or tantalum disilicide of Wittenauer (271) into the borosilicate glass composition of Goldstein in order to increase the high temperature performance of the coating.

Regarding claims 11-12, Goldstein and Wittenauer (271) together disclose all of the limitations of claim 1. Neither Goldstein nor Wittenauer (271) disclose a particle size of the components of 5μm or less or a mode of 1μm or less but Goldstein does disclose that the properties of the coating may be modified by varying the particle size and size distribution of the components for the intended application (column 6 line 66 – column 7 line 1), Therefore, it

would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle sizing of the components for the intended application since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 38 and 41-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,093,771 to Goldstein et al. in view of U.S. Patent 6,444,271 B2 to Wittenauer (271) et al.

Regarding claim 38, Goldstein discloses a reaction glass coating (RGC) of borosilicate glass and at least one intermetallic or metallic substance such as silicon hexaboride, which can also act as a fluxing agent processing aid (as indicated in the abstract of U.S. Patent 5,079,082 to Leiser et al). Goldstein discloses this coating as particularly useful on porous silica structures such as space shuttle heat shields (column 2 line 1), which are used at high temperatures. Goldstein discloses the coating to provide temperature resistance up to about 1482°C. Goldstein does not disclose a tantalum disilicide in the coating. Wittenauer (271) discloses a ceramic oxide base structure (substrate) such as fibrous silica based materials (column 1 lines 21-22) and alumina silica blends with a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (column 3 lines 53-58) (with a composition of TaSi2) (also commonly called tantalum disilicide). Wittenauer (271) discloses the use of such silicides for the purpose of providing to a substrate with oxidation

protection, high emissivity, and resistance to mechanical damage along with the ability to withstand high temperature environments, including those associated with atmospheric reentry, jet turbine combustion, and rocket propulsion (column 2 lines 58-62) as may occur with space shuttle operation, with higher temperature performance than silica based coatings (column 2 lines 54-65). Wittenauer (271) discloses the use of such silicides for the purpose of providing a substrate with a higher temperature coating than silica–based coatings (column 2 lines 63-65). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the high temperature silicide material such as molybdenum and or tantalum disilicide of Wittenauer (271) into the borosilicate glass composition of Goldstein in order to increase the high temperature performance of the coating.

Regarding claims 41-43, Goldstein discloses a coating sintered at 2225°F (column 4 lines 49-51), however, claims 41-43 are product by process claims and the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced by the process is in some manner measurably distinct from the product produced by another process." *See MPEP 2113.* As such, the process limitations within claims 41-43 do not provide patentable distinction over the prior art.

Regarding claims 44-45, Goldstein and Wittenauer (271) together disclose all of the limitations of claim 38. Neither Goldstein nor Wittenauer (271) disclose a particle size of the components of 5μm or less or a mode of 1μm or less but Goldstein does disclose that the properties of the coating may be modified by varying the particle size and size distribution of the components for the intended application (column 6 line 66 – column 7 line 1). Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle sizing of the components for the intended application since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 1-4 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,079,082 to Leiser et al. in view of U.S. Patent Application 2001/0051218 A1 to Wittenauer et al.

Regarding claims 1-4, and 10, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent (column 2 line 60 – column 3 line 2). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose

a tantalum disilicide in the coating but Wittenauer (218) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi2) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]). Wittenauer (218) discloses the use of such silicides for the purpose of providing a substrate with oxidation protection, high emissivity, and resistance to mechanical damage (pages 1-2 paragraph [0015]). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide or both as disclosed by Wittenauer (218) as the emittance agent(s) of in Leiser.

Regarding claims 11-12, Leiser and Wittenauer (218) disclose all of the limitations of claim 1. Leiser does not disclose a particle size of the components of 5μm or less or a mode of 1μm or less. Leiser does disclose that the particle size used to make the coating is reduced to improve impregnation of the outer portion of the substrate. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the particle size and particle size mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 38-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,079,082 to Leiser et al. in view of U.S. Patent Application 2001/0051218 A1 to Wittenauer et al.

Regarding claim 38, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent (column 2 line 60 – column 3 line 2). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose a tantalum disilicide in the coating but Wittenauer (218) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (page 2 paragraph [0026]) (with a composition of TaSi2) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as fibrous silica based materials (page 1 paragraph [0012]) and alumina silica blends (page 2 paragraph [0025]). Wittenauer (218) discloses the use of such silicides for the purpose of providing a substrate with oxidation protection, high emissivity, and resistance to mechanical damage (pages 1-2 paragraph [0015]). Because Wittenauer (218) discloses the silicides as analogous materials (page 2 paragraph [0028]), it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide or both as disclosed by Wittenauer (218) as the emittance agent(s) in Leiser.

Regarding claims 39-40, Leiser discloses the substrate is at least in part impregnated with a reactive glass frit, a fluxing agent, and an emittance agent (column 2 lines 40-45).

Regarding claims 41-43, claims 41-43 are product by process claims and the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced by the process is in some manner measurably distinct from the product produced by another process." *See MPEP 2113.* As such, the process limitation within claims 41-43 does not provide patentable distinction over the prior art.

Regarding claims 44-45, Leiser and Wittenauer (218) disclose all of the limitations of claim 38. Leiser does not disclose a particle size of the components of 5μm or less or a mode of 1μm or less. Leiser does disclose that the particle size used to make the coating is reduced to improve impregnation of the outer portion of the substrate. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the particle size and particle size mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 1-4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,079,082 to Leiser et al. in view of U.S. Patent 6,444,271 B2 to Wittenauer et al.

Regarding claims 1-4 and 10, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent (column 2 line 60 – column 3 line 2). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose a tantalum disilicide in the coating but Wittenauer (271) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (column 3 lines 53-59) (with a composition of $TaSi2$) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as alumina silica blends (column 3 lines 44-46). Wittenauer (271) discloses the use of such silicides for the purpose of providing a substrate with a higher temperature coating than silica–based coatings (column 2 lines 63-65). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide or both as disclosed by Wittenauer (271) as the emittance agent(s) of in Leiser.

Regarding claims 11-12, Leiser and Wittenauer (271) disclose all of the limitations of claim 1. Leiser does not disclose a particle size of the components of 5μm or less or a mode of 1μm or less. Leiser does disclose that the particle size used to make the coating is reduced to

improve impregnation of the outer portion of the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle size and particle size mode for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 38-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,079,082 to Leiser et al. in view of U.S. Patent 6,444,271 B2 to Wittenauer et al.

Regarding claim 38, Leiser discloses a composite insulating material comprising a porous body of fibrous low-density silica-based insulation material at least partially impregnated and therefore coated with a reactive glass frit, a fluxing agent and an emittance agent (column 2 lines 29-45). Leiser discloses a borosilicate glass matrix as the reactive glass frit, a silicon tetraboride flux or processing agent molybdenum disilicide as the emittance agent (column 2 line 60 – column 3 line 2). Leiser discloses that silicon hexaboride may be used in place of silicon tetraboride as the fluxing agent (column 4 lines 32-36). Leiser does not disclose a tantalum disilicide in the coating but Wittenauer (271) discloses a silicide coating, containing elements with melting points in excess of 1650°C, including molybdenum silicide or disilicide or tantalum silicide (column 3 lines 53-59) (with a composition of TaSi2) (also commonly called tantalum disilicide) on a ceramic oxide base structure (substrate) such as alumina silica blends (column 3 lines 44-46). Wittenauer (271) discloses the use of such silicides for the purpose of providing a

substrate with a higher temperature coating than silica –based coatings (column 2 lines 63-65). Therefore it would have been obvious to a person having ordinary skill in the art at the time of the invention to utilize either tantalum disilicide or molybdenum disilicide or both as disclosed by Wittenauer (271) as the emittance agent(s) of in Leiser.

Regarding claims 39-40, Leiser discloses the substrate is at least in part impregnated with a reactive glass frit, a fluxing agent, and an emittance agent (column 2 lines 40-45).

Regarding claims 41-43, claims 41-43 are product by process claims and the patentability of the product does not depend on its method of production. "If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process unless it can be shown that the product produced by the process is in some manner measurably distinct from the product produced by another process." *See MPEP 2113.* As such, the process limitations within claims 41-43 do not provide patentable distinction over the prior art.

Regarding claims 44-45, Leiser and Wittenauer (271) disclose all of the limitations of claim 38. Leiser does not disclose a particle size of the components of 5μm or less or a mode of 1μm or less. Leiser does disclose that the particle size used to make the coating is reduced to improve impregnation of the outer portion of the substrate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to adjust the particle size and particle size mode for the intended application, since it has been held that

discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

### *Allowable Subject Matter*

Claims 5-9 and 13-29 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 5-9, Prior art of record does not disclose nor does it render obvious percentages of components of layers comprising tantalum disilicide, molybdenum disilicide and borosilicate glass.

Regarding claims 13-29, Prior art of record does not disclose a sublayer comprising molybdenum disilicide, silicon hexaboride and borosilicate glass impregnating the surface of the substrate combined with any additional layers comprising tantalum disilicide, molybdenum disilicide, silicon tetraboride and borosilicate glass nor does it disclose or render obvious percentages of components of layers comprising tantalum disilicide, molybdenum disilicide and borosilicate glass.

Claims 30-37 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Prior art of record does not disclose a sublayer comprising molybdenum disilicide, silicon hexaboride and

borosilicate glass impregnating the surface of the substrate combined with any additional layers comprising tantalum disilicide, molybdenum disilicide, silicon tetraboride and borosilicate glass.

## *Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent 6,749,942 B1 to Wittenauer et al. discloses the use of tantalum disilicide and molybdenum disilicide as components in a thermal insulating system used in applications associated with atmospheric reentry, jet turbine combustion, and rocket propulsion.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elizabeth Ivey whose telephone number is (571) 272-8432. The examiner can normally be reached on 7:00- 4:30 M-Th and 7:00-3:30 alt. Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones can be reached on (571)272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elizabeth D. Ivey

Elizabeth D. Ivey

Deborah Jones

DEBORAH JONES
SUPERVISORY PATENT EXAMINER